Work Order ID 76573 *76573* U/R Page 1

November-17-11 1:03:05 PM

Item ID: D350-748-101 POSITIVE RECALL **Accept** *N900040100* **Setup Start** *NS1*

Revision ID: ~~U/K~~ **Stop** *NS2*

Item Name: Crosstube Installation, High Fwd

Start Date: 17/11/2011 **Start Qty:** 1.00 *1*

Required Date: 07/12/2011 **Req'd Qty:** 1.00 *1*

Reference:

Cust Item ID:

Customer:

Approvals: **Process Plan:** M.L.J **Date:** 11/11/17 **Tooling:** _____ **Date:** _____

QC: _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____

Run Start *NR1*

Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
Draw Nbr	**Revision Nbr**								
D350-748-141	F U/K OK 11.11.17								
100	DOCUMENT CONTROL	0.00							
100									
DC	**Memo**	0.00							
Document Control	Photocopy bluefile & type labels per PPPD350-748-101		CHG002			(1)			12-05-23
									for MLJ 12-5-23
110	BENDING MACHINE - CROSSTUBES	0.00							
110									
CNC Bend 1	**Memo**	0.00							
CNC Delta 100 Bender	Bend tube as per Dwg D350-748-141 using CNC bender program D350F and Folio FT_____					(1)			SAD 12-04-03
120	QC15- Crosstube Dimensional Check	0.00							
120									
QC	**Memo**	0.00							
Quality Control						12.04.11 (1)			

2.015 2.016 2.327 2.328

...t Aerospace Ltd

W/O: 76573		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
12/6/12	111	After test assembly, touch-up paint finish per QSI 045		AB 12-6-12		12/6/12 QSI 042	
12/6/12	112	Inspect finish, QC 14		12/04/13		12/6/12	

Part No: D350-748-101 PAR #: _____ Fault Category: X - tube NCR: Yes No DQA: [signature] Date: 12/06/16

Resolution: Rework Disposition: Rework QA: N/C Closed: [signature] Date: 12/6/18

NCR: 12-1504		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B: Initial Chief Eng	Action Description Chief Eng	Sign & Date	Verification Section C	Approval Chief Eng	Approval QC Inspector
12.04.11	110	~~Cut~~ tube too high & narrow after bending	12.04.11 QSI 042	- Cut to 23.40" high. - Acceptable	MO 12-4-18	JW 12-4-18	12.04.11 QSI 042	12/04/18
12.04.11	110	↓	12.04.11	PAIR w/ AFT tube bin 73807. Do Assembly of gear at DARS	[signature] 12.06.12	12.06.12	12/6/12 QSI 042	12-06-12
12.04.19	110	Tube crushing is over tolerance	12.04.19 QSI 042	Acceptable based on attached SR	N/A	12/05/19	12.04.19 QSI 042	12/05/19

NOTE: Date & initial all entries

Item ID: D350-748-101 **Accept** *N900040100* **Setup Start** *NS1*
Revision ID: U/R **Stop** *NS2*
Item Name: Crosstube Installation, High Fwd
Start Date: 17/11/2011 **Start Qty:** 1.00 *1*
Required Date: 07/12/2011 **Req'd Qty:** 1.00 *1*
Reference:
Cust Item ID:
Customer:

Approvals: **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____
QC: _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____

Run Start *NR1*
Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
125 *125* HandFXtube Hand Finishing Crosstubes	Memo: ***Stress relief*** Heat treat crosstube as per QSI010 4.3 Temp:_____ Start time:_____ Finish time:_____	0.00 0.00							
127 *127* QC Quality Control	QC6- Inspect dimensions to drawing Memo	0.00 0.00							

Purch. issue PO to metcar
PO: 16638
per DEO D350-748-141 F.L
CL 12/04/04 (1)
QP 12.04.11 (1)

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W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Item ID: D350-748-101 **Accept** *N900040100* **Setup Start** *NS1*
Revision ID: U/R **Stop** *NS2*
Item Name: Crosstube Installation, High Fwd
Start Date: 17/11/2011 **Start Qty:** 1.00 *1*
Required Date: 07/12/2011 **Req'd Qty:** 1.00 *1*
Reference:
Cust Item ID:
Customer:

Approvals: **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____
QC: _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____

Run Start *NR1*
Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
130		0.00							
130	Crosstubes								
Crosstubes	**Memo**	0.00							
Crosstubes	1-Drill Tube as per Dwg D350-748-141 Using DT8876 A,B &C Drill Jigs, Set-up drill table as per QSI 010								
	2-Deburr								
	3-Engrave Part # and Batch # as per Dwg D350-748-141								
	4-Remove all marks from tube within limits of D350-748-141								
	~~5-Apply a light coat of LPS3 on the interior of tube~~ N/A Batch:_____								
140	QC5- Inspect part completeness to step on W/O	0.00							
140									
QC	**Memo**	0.00							
Quality Control	CHECK 10 DEG HOLES WITH DT8876E (EUROCOPTER CLAMP)								

JW 12-04-23

MO 12-4-23

12/04/23

Pb-7

Dart Aerospace Ltd

W/O: 76573	WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
		See NCR other					

Part No: D350-748-101 PAR #: ______ Fault Category: X-tube NCR: (Yes) No DQA: ____ Date: ______

Resolution: rework Disposition: rework QA: N/C Closed: ______ Date: ______

NCR: 12-1505	WORK ORDER NON-CONFORMANCE (NCR)							
			Corrective Action Section B					
DATE	STEP	Description of NC Section A	Initial Chief Eng	Action Description Chief Eng	Sign & Date	Verification Section C	Approval Chief Eng	Approval QC Inspector
12/04/19	100	Cuffs found to have ovalit[illegible] on one side Ranges to 0.060" to 0.100" out[illegible]	12.04.19	Rework as per attached email Original min 2.192" max 2.266" after rework min 2.227" max 2.249"	12.04.19	RM	12.04.19	
		Re Heat treat [illegible]						

NOTE: Date & initial all entries

H:\fFORMS\Quality Assurance\approved QA\NCRWO RevE

Item ID: D350-748-101 **Accept** *N900040100* **Setup Start** *NS1*
Revision ID: U/R **Stop** *NS2*
Item Name: Crosstube Installation, High Fwd
Start Date: 17/11/2011 **Start Qty:** 1.00 *1*
Required Date: 07/12/2011 **Req'd Qty:** 1.00 *1*
Reference:
Cust Item ID:
Customer:

Approvals: **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____
QC: _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____

Run Start *NR1*
Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
150	Outsource process-Cadplate per QSI017 4.1.9.1	0.00							
150									
Outsource3	**Memo**	0.00							
Outsource process - Cad plate	Issue P/O: 16826 Stress relief at 375° for 5 hours Magnetic Particle Inspect per ASTM E1444 Cadium Plate per AMS-QQ-P-416B, Class 1, Type 2 Embrittle relief at 375° for 8 hours, Chromate Treat Possibe Supplier: Southwest United Industries Ensure Certificate of Conformity is attached								
160	Receive & Inspect for Damage & Mat'l Certs	0.00							
160									
Packaging	**Memo**	0.00							
Packaging	Ensure certificate of conformity is attached								
170	QC5- Inspect part completeness to step on W/O	0.00							
170									
QC	**Memo**	0.00							
Quality Control									

CL 12/04/25 (1)

SEE W/O CHG ATTACHED 12/4/15 0

12.05.22

POSITIVE RECALL
EFFECTIVE 12.04.11 AUTH CP
RELEASED CP DATE 12.6.11

Purch. issue P/O to Acuren P/O 17031 CL 12/05/22

rec'd rec'd + inspect attached c/c to w/o 12/12/29

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Item ID: D350-748-101 **Accept** *N900040100* **Setup Start** *NS1*
Revision ID: U/R **Stop** *NS2*
Item Name: Crosstube Installation, High Fwd
Start Date: 17/11/2011 **Start Qty:** 1.00 *1*
Required Date: 07/12/2011 **Req'd Qty:** 1.00 *1*
Reference:
Cust Item ID:
Customer:

Approvals: **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____
QC: _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____

Run Start *NR1*
Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
180		0.00							
180	SprayPaint					AL	12-5-20		
SprayPaint	**Memo**	0.00							
Spray Painting	1-Prime inside crosstube as per QSI 005 4.2 B120133 start 6:30 Finish: 7:15 2-Prime Outside of Tube as per Dart QSI 005 4.2 B121625 start 11:15 Finish 12:00								
190	QC14- Inspect Spray Paint	0.00							
190									
QC	**Memo**	0.00							
Quality Control	Then, Wrap in plastic bag to protect from scratches								
200		0.00							
200	Crosstubes								
Crosstubes	**Memo**	0.00							
Crosstubes	1-Install Ground wire Insert, then insert screw and washer 2-Install Abraision strips as per Dwg D350-748-141 & QSI 035. 3-Install supports Using Dt8876 as per Dwg D350-748-141, Torque to 60-80 IN-LBS								

12-05-22 12:05:22

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Item ID: D350-748-101 **Accept** *N900040100* **Setup Start** *NS1*
Revision ID: U/R **Stop** *NS2*
Item Name: Crosstube Installation, High Fwd
Start Date: 17/11/2011 **Start Qty:** 1.00 *1*
Required Date: 07/12/2011 **Req'd Qty:** 1.00 *1*
Reference:
Cust Item ID:
Customer:

Approvals: **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____
QC: _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____

Run Start *NR1*
Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
210	QC5- Inspect part completeness to step on W/O	0.00							
210									
QC	**Memo**	0.00 12/05/23							
Quality Control									
220	Pick Kit	0.00							
220									
Packaging	**Memo**	0.00				1			12/05/23 JB
Packaging									
230	QC4- 100% Inspect kits for completeness	0.00							
230									
QC	**Memo**	0.00				1			12/05/23
Quality Control									

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Item ID: D350-748-101 **Accept** *N900040100* **Setup Start** *NS1*
Revision ID: U/R **Stop** *NS2*
Item Name: Crosstube Installation, High Fwd
Start Date: 17/11/2011 **Start Qty:** 1.00 *1* **Cust Item ID:**
Required Date: 07/12/2011 **Req'd Qty:** 1.00 *1* **Customer:**
Reference:

Approvals: **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____ **Run Start** *NR1*
QC: _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____ **Stop** *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
240		0.00							
240	Packaging								
Packaging									
Packaging	**Memo**	0.00							
	Identify and pack for shipping as per PPP D350-748-101 Location:_____ PPP Rev:C								
250	QC21- Final Inspection - Work Order Release	0.00							
250									
QC	**Memo**	0.00							
Quality Control									

12/6/23 MF

MF
12-05-23

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Picklist Print

November-17-11 1:03:10 PM

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Work Order ID: 76573 *76573*

Parent Item: D350-748-101 *D350-748-101*

Parent Item Name: Crosstube Installation, High Fwd

Start Date: 17/11/2011 **Required Date:** 07/12/2011

Start Qty: 1.00 **Required Qty:** 1.00

Comments:
IPP Rev:A New Issue 06-07-05 JLM
IPP Rev:B Update qty of MS21042L5 06-09-12 KJ
IPP Rev:C Rev B 07-11-15 DD
IPP Rev D Combined manufacturing 08.04.02 EC verified by: DD
IPP Rev:E 08-06-24 revD as per dwg DD verified by:EC IPP Rev:F
10.08.04 added QSI010 4.3 DD verf:EC

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D350-748-141TRN		Manufactured	No			110	Each	3.0000	1	1			
D350-748-141TRN									**	SAD 12-04-03			
Crosstube Turning Detail													

Location	Loc Qty	Loc Code
LG	3	
73574	1	
73577	1	
73580	1	

B74675

ALS4-1032-225		Purchased	No			200	Each	1,983.000	1	1			
ALS4-1032-225									**			12-05-22	
Insert													

Location	Loc Qty	Loc Code
ST281	1983	
108696	283	
110768	62	
118386	858	
118966	780	

B# 121269

AN960JD10	NAS1149D0363J	Purchased	No			200	Each	0.0000	1	1			
AN960JD10									**			12-05-22	
Washer													

B# 121243

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Picklist Print

November-17-11 1:03:10 PM

Work Order ID: 76573 *76573*

Parent Item: D350-748-101 *D350-748-101*

Parent Item Name: Crosstube Installation, High Fwd

Start Date: 17/11/2011 **Required Date:** 07/12/2011

Start Qty: 1.00 **Required Qty:** 1.00

D2856-400	Manufactured	No		200	f	278.8445	1.181	1.243158	
D2856-400							**		12·05·22

Abraison Strip

Location	Loc Qty	Loc Code
ST403	0.3149	
68076	0.3149	
ST409	278.5296	
63735	0.6696	
71164	61.86	
73491	216	

R# 79551

D3502-1	Manufactured	No		200	Each	35.0000	2	2	
D3502-1							**		12·05·22

Support

Location	Loc Qty	Loc Code
ST063	35	
68951	1	
72129	14	
73419	20	

R# 74873

MS21920-20	Purchased	No		200	Each	70.0000	2	2	
MS21920-20							**		12·05·22

Clamp (per MIL-DTL-8783C)

Location	Loc Qty	Loc Code
LG050	70	
116799	10	
118649	10	
119386	50	

R# 121067

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Picklist Print

November-17-11 1:03:10 PM

Work Order ID: 76573 *76573*

Parent Item: D350-748-101 *D350-748-101*

Parent Item Name: Crosstube Installation, High Fwd

Start Date: 17/11/2011 **Required Date:** 07/12/2011

Start Qty: 1.00 **Required Qty:** 1.00

MS27039-1-10	Purchased	No		200	Each	207.0000	1	1	
MS27039-1-10						**			12.05.22
Screw									

Location	Loc Qty	Loc Code
ST291	207	
118612	61	
119307	96	
119531	50	

RS# 120120

AN4-41A	Purchased	No		220	Each	297.0000	8	8	✓
AN4-41A						**			JB
Bolt									

Location	Loc Qty	Loc Code
ST360	297	
115108	3	
115705	7	
116191	12	
117619	50	117619
117795	25	
118451	50	
118838	50	
119328	100	

AN4-6A	Purchased	No		220	Each	5,062.000	16	16	✓
AN4-6A						**			121631 JB 12/05/23
Bolt									

Location	Loc Qty	Loc Code
ST356	62	
119127	62	
ST516	5000	
119017	5000	

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Picklist Print

November-17-11 1:03:11 PM

Work Order ID: 76573 *76573*

Parent Item: D350-748-101 *D350-748-101*

Parent Item Name: Crosstube Installation, High Fwd

Start Date: 17/11/2011 **Required Date:** 07/12/2011

Start Qty: 1.00 **Required Qty:** 1.00

AN5-32A		Purchased	No		220	Each	191.0000	4	4 ✓	
AN5-32A								**	121415 JB	
Bolt										

Location	Loc Qty	Loc Code
ST339	191	
118422	16	
118628	50	
118983	25	
119328	100	

AN960JD416	NAS1149D0463J	Purchased	No		220	Each	0.0000	32	32 ✓	
AN960JD416								**	121708 JB	
Washer										
AN960JD516	NAS1149D0563J	Purchased	No		220	Each	0.0000	8	8 ✓	
AN960JD516								**	119546 JB	
Washer										
D3500-1		Manufactured	No		220	Each	12.0000	4	4 ✓	
D3500-1								**	76000 JB 12/05/23	
Saddle										

Location	Loc Qty	Loc Code
ST424	4	
70695	4	
ST427	8	
73407	8	

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Picklist Print

November-17-11 1:03:11 PM

Work Order ID: 76573 *76573*

Parent Item: D350-748-101 *D350-748-101*

Parent Item Name: Crosstube Installation, High Fwd

Start Date: 17/11/2011 **Required Date:** 07/12/2011

Start Qty: 1.00 **Required Qty:** 1.00

D3501-1	Manufactured	No		220	Each	428.0000	16	16 ✓
D3501-1						**		JB
Bushing								

Location	Loc Qty	Loc Code
ST063	428	
67757	4	
70682	100	70682
73391	117	
74866	207	

MS21042L4	Purchased	No		220	Each	11,520.00	24	24 ✓
MS21042L4						**		12/01/11 12/05/23
Nut								

Location	Loc Qty	Loc Code
ST300	558	
117441	51	
117601	374	
118451	133	
ST516	5962	
119017	5962	
ST518	5000	
119075	5000	

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Picklist Print

November-17-11 1:03:11 PM

Work Order ID: 76573 *76573*

Parent Item: D350-748-101 *D350-748-101*

Parent Item Name: Crosstube Installation, High Fwd

Start Date: 17/11/2011 **Required Date:** 07/12/2011

Start Qty: 1.00 **Required Qty:** 1.00

MS21042L5	Purchased	No		220	Each	2,300.000	4	4 ✓

MS21042L5

Nut

**

JB 12/05/23

Location	Loc Qty	Loc Code	
ST300	800		
116105	5		
116548	43		
117611	52		
118179	496		
118910	204		
ST518	1500		
119109	1500		119109

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

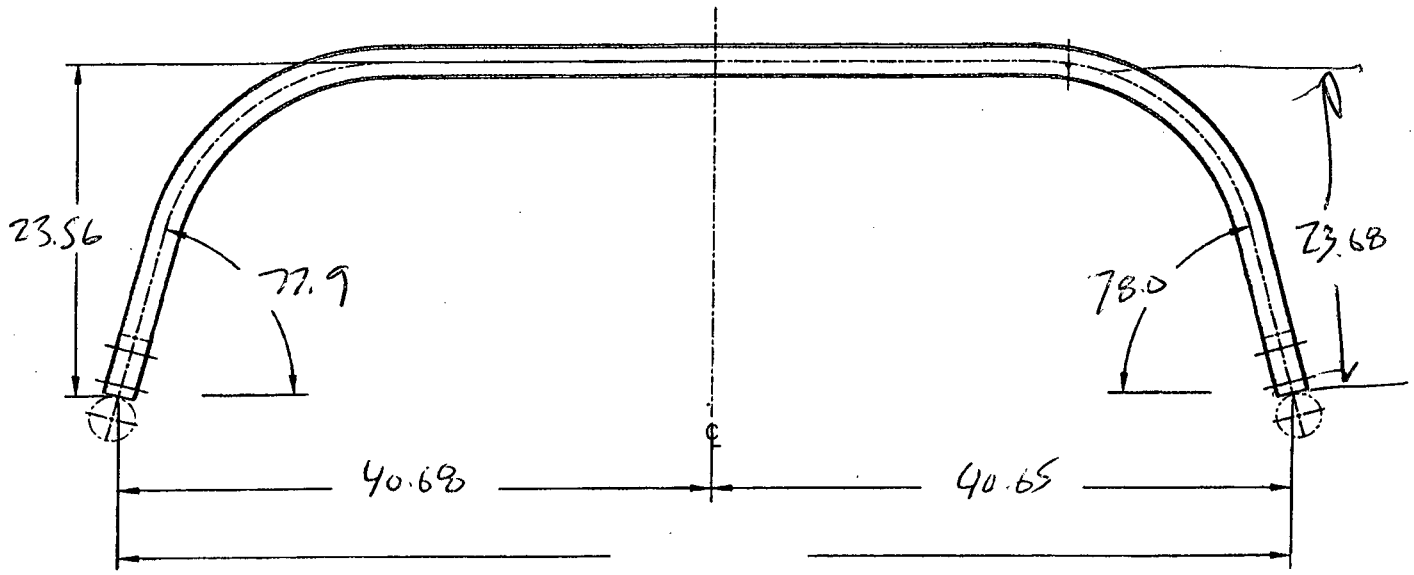
Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

DART AEROSPACE LTD	Work Order:	76573
Description: Crosstube High Fwd (AS350/355)	Part Number:	D350-748-101
Inspection Dwg: D350-748-141 **Rev:** F		Page 1 of 1

Required Dimension	Min	Max
Height	23.13	23.37
1/2 Span	40.78	41.02
Angle	75	77
Total Span	81.56	82.04



Comments
Twist 0.223
CRUSHING 7.2% / 7.3%

QC15 Inspection	CP
Date	12.04.11

Rev	Date	Change
A	07.02.06	New Issue
B	10.08.23	Dwg Rev updated
C	11.11.07	Dwg Rev updated

	L	R
½	40.6875	40.65
H	23.55	23.65
∠	77.9°	78.0°

Twist 0.276

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Item	Qty -141	Part Number	Description
1	X	D350-748-141	CROSSTUBE ASSEMBLY (AS 350/355 HI FWD)
2	1	D6015-125	CROSSTUBE (OR D6017-115)
3	2	D3502-1	SUPPORT
4	2	D2856-400-710	ABRASION STRIP
5	1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
8	1	MS27039-1-10	SCREW

SHOP COPY
RETURN TO
ENGINEERING
UNCONTROLLED COPY
SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER
NO. 76573 M.L.J
11/11/17

UNDER REVIEW
11.07.12

RELEASED
2011-01-18

GENERAL NOTES:

1) MATERIAL: MANUFACTURED FROM D6015-125 OR D6017-115
   FINISHED LENGTH = 110.270±0.06
2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2
   CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II
   PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
   PAINT OUTSIDE PER DART QSI 005 4.2
3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
4) UNITS: INCHES UNLESS OTHERWISE NOTED.
5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
6) IDENTIFICATION: DART PART NUMBER "D350-748-141" AND BATCH NUMBER ON INSIDE OF CUFF PER DART QSI 044 6.4 (VIBRATING STYLUS)
7) WEIGHT: 30.45 lbs
8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.
9) BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALY, TRANSITION SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
10) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
11) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING. ACCEPTABLE TO VERIFY TENSILE STRENGTH BY HARDNESS TEST PER ASTM E18 TO 40-45 HRC.
12) INSTALL D2856-400-710 ABRASION STRIPS WITH A GAP ON BOTTOM SIDE OF CROSSTUBE, CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
13) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.
14) TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.
15) MAX TWIST AFTER BENDING: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.25 (ZN C1-3).

REV.	DESCRIPTION	BY	DATE
F	ADD HRC TEST OPTION (B8-1) PER PAR 09-040, ADD TWIST LIMIT (A8-1, C1-3), ADD D6015-125 OPTION (C8-1), STOCK DIM NOW MACHINED (D1-4)	CP	10.11.23
E	REVISE GENERAL NOTES; UPDATE TO CURRENT ADD STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A6-3); TOLERANCES (ZN C6-3, D1-3)	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATE AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6017-115 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	06.03.31

DESIGN		DART AEROSPACE LTD	
DRAWN		HAWKESBURY, ONTARIO, CANADA	
CHECKED		DRAWING NO.	REV. F
MFG. APPR.		D350-748-141	SHEET 1 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE	10.11.23		

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

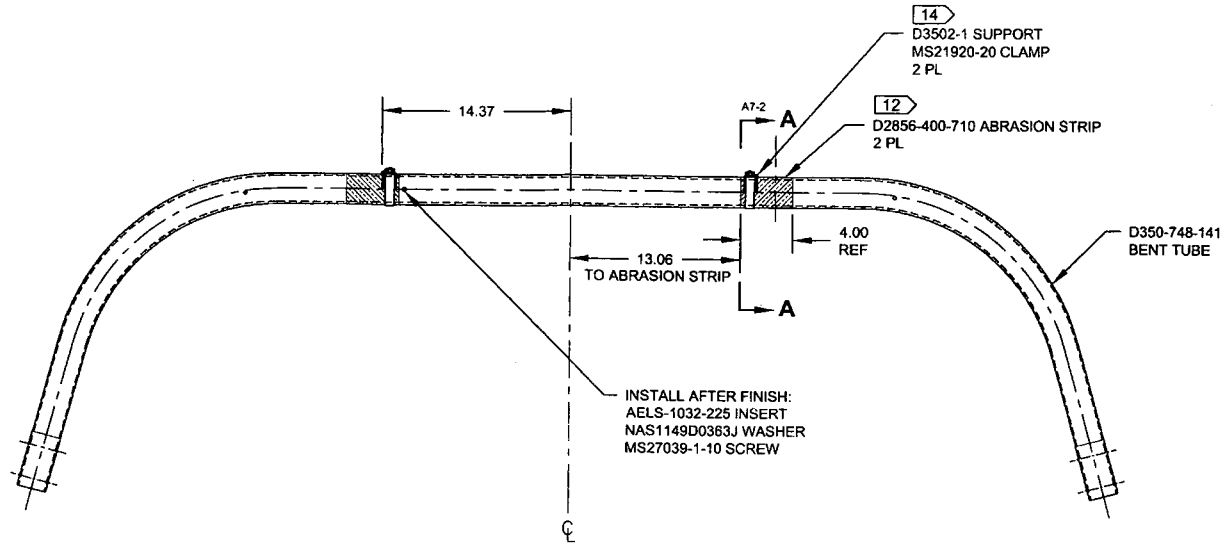
Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

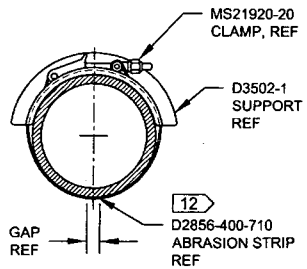
NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

76573



D350-748-141
ASSEMBLY DETAIL



SECTION A-A D4-2
SCALE 4X

UNDER REVIEW
11.07.11

RELEASED
2011-01-18

DESIGN		**DART AEROSPACE LTD** HAWKESBURY, ONTARIO, CANADA
DRAWN		
CHECKED		DRAWING NO. REV. F
MFG. APPR.		D350-748-141 SHEET 2 OF 4
APPROVED		TITLE SCALE
DE APPR.		CROSSTUBE (AS 350/355 HI FWD) NTS
DATE 10.11.23		

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

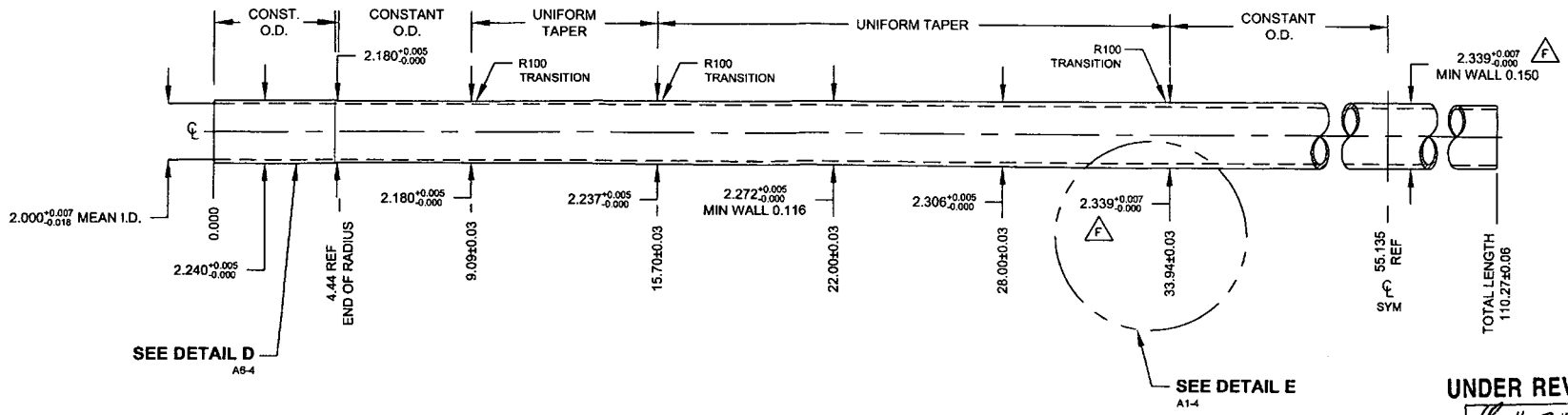
Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

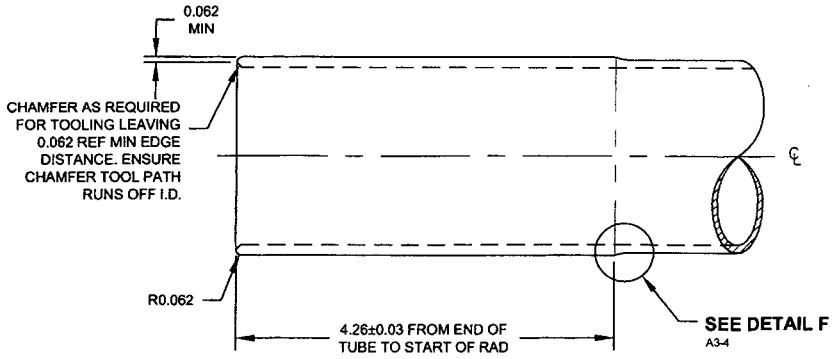
NOTE: Date & initial all entries

76573

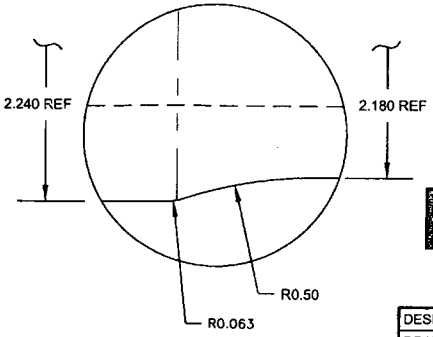


UNDER REVIEW
11.07.12

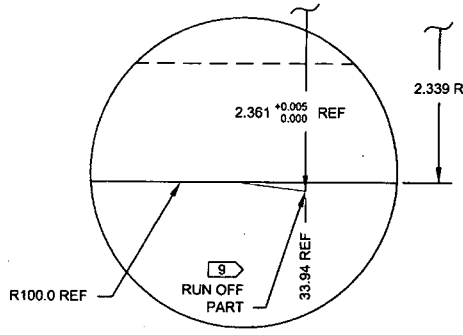
D350-748-141TRN
TURNING DETAIL



DETAIL D:
CROSSTUBE CUFF C7-4
SCALE 3X



DETAIL F:
CUFF TRANSITION A5-4
NOT TO SCALE



RELEASED
2011-01-18

DETAIL E:
TAPER RUN-OFF C3-4
NOT TO SCALE

DESIGN		**DART AEROSPACE LTD** HAWKESBURY, ONTARIO, CANADA
DRAWN		
CHECKED		DRAWING NO. D350-748-141 REV. F SHEET 4 OF 4
MFG. APPR.		
APPROVED		TITLE CROSSTUBE (AS 350/355 HI FWD) SCALE NTS
DE APPR.		
DATE 10.11.23		

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

DRAWING NO.	TITLE	REV. F	DART AEROSPACE LTD	D.E.O. NO.	SHEET NO.	SCALE
D350-748-141	CROSSTUBE (AS 350/355 HI FWD)		ENGINEERING ORDER	D350-748-141 F-1	SHEET 1 OF 1	NTS

DRAWN	CHECKED	MFG. APPR.	APPROVED	DE APPR.
DATE 12.04.02	DATE 12.04.03	DATE 12.04.03	DATE 12.04.03	DATE 12.04.03

PURPOSE:
ADD A STRESS RELIEF OPERATION FOLLOWING BENDING

CHANGE:

ADD

10) AFTER BENDING: STRESS RELIEF AT 650°F ± 25°F FOR A MINIMUM OF 2 HRS.
AIR COOL TO AMBIENT TEMPERATURE
(REF. AMS2759/1E)

Dart Aerospace Ltd

W/O: 16573	WORK ORDER CHANGES						
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector
11.10.05	161	LOAD TUBE TO 3500lb FOR 1 MINUTE. REF D.S. EMBIL.		12.05.15	1	12.05.15	
11.10.05	162	NDT TUBE.					

Part No: D350-748-101 **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:	WORK ORDER NON-CONFORMANCE (NCR)							
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Chris Provencal

From: David Shepherd <dshepherd@dartaero.com>
Sent: Tuesday, April 27, 2010 3:40 PM
To: 'Mike Petsche'
Cc: 'Bill Beckett'; 'L Lacelle'; 'Chris Provencal'; 'Dan Stow'; ssheldon@dartaero.com
Subject: 350 crosstubes

Mike,

I discussed the 350 crosstube load testing with Bill a little while ago and this plan makes sense to him.

So, my recommendation to clear these crosstubes is to load the fwd crosstubes to 3500 lb and the aft crosstubes to 3000 lb in the deflection test rig and document on the work orders that this test has been completed. Hold max load for 1 minute. Per TP-D350-748-2, these loads represent the maximum load on these crosstubes at gross weight and are below the yield point of the material. I would like to request that Chris Provencal witness these tests and sign off the work orders based on his experience with Dart landing gears. My feeling is that if there is a problem with the parts, it will manifest itself during this load test. I, for one, would feel a lot more confident in testing each crosstube in this manner than relying totally on what Exova has to say. I think it would be very difficult to reach a conclusion on the whole batch on the basis of cracks in two parts from the batch.

I believe that we can accomplish this before next Friday, which also gives us time to hear what Exova has to say in case it has an impact on our decision. So far, what I have seen from Exova shows me that there are fluctuations in the heat treating but the tubes are heat treated to our specification.

For this reason, I believe we should tell DHS that it looks like we will be able to start shipping 350 crosstubes by May 7th pending a successful Engineering test of the material.

David.

METCOR INC.

560 BOUL. ARTHUR-SAUVÉ
ST-EUSTACHE, QC, J7R 5A8
Tel: 450-473-1884 / Fax: 450-491-5498

Certificat de Conformité Détaillé
Detailed Certificate of Compliance

BON DE TRAVAIL order	CHARGEMENT load
175005	1

CLIENT / customer 215
DART AEROSPACE
1270 ABERDEEN
HAWKESBURY ON K6A 1K7

LIVRÉ À / shipped to: 1
DART AEROSPACE
1270 ABERDEEN
HAWKESBURY ON K6A 1K7

COMMANDE DU CLIENT customer po	BON DE LIVRAISON DU CLIENT customer shipper no.	MATÉRIEL material	CODE DE TRAITEMENT mat'l heat code	NUMÉRO DE LOT lot number
PO16638		Steel		

SPÉCIFICATIONS DU PROCÉDÉ
processing specifications

STRESS REL

SAE AMS 2759/1 REV.E

EXIGENCE / requirement	SPÉCIFICATIONS / specified	TESTS EXÉCUTÉS / performed	RÉSULTATS DE TESTS / results
Visual			

QUANTITÉ quantity	POIDS weight	DESCRIPTION DES PIÈCES parts description
9	270	D350-748-101 (7) CROSS TUBE (2) D350-748-201 CROSS TUBE CONTENANT: 1 NIL

Operation	Temp. spécifiée Specified Temp	Temps de trempe Spécifié Specified Soak Temp	Atmosphere	Carbone Carbon Potential	Q-Media Q-Temp	Four # Furnace #	Date Départ Start Date	Heure d'entrée Time In	Heure de sortie Time Out	Date Complétée Date complete
1,00 CONT. INIT.	LAVAGE		si nécessaire							
2,00 PREPARINC	COMPTAGE									
3,00 STRESS RE	650 +/-25°F	2 hrs	air			701				
4,00 FINAL INSP							04-05-2012			04-05-2012

COMMENTAIRES / comments

ALL THE HEAT TREATMENT PROCESSING PERFORMED ON THIS ORDER WAS ACCOMPLISHED USING HEAT TREATMENT EQUIPEMENT THAT MEETS THE REQUIREMENTS OF AMS 2759. ALL THE HEAT TREATMENT OPERATIONS WERE ACCOMPLISHED IN ACCORDANCE WITH THE REQUESTED/REQUIRED HEAT TREATMENT SPECIFICATION AND ALL REQUIRED VERIFICATIONS TEST HAVE BEEN PERFORMED AND DOCUMENTED. NO UNAUTHORIZED CHANGES OR DEVIATIONS TO REQUIRED HEAT TREATMENT SPECIFICATIONS OR PROCEDURES HAVE BEEN PERFORMED.

Metcor Inc.

Metcor Inc.
560, boul. Arthur-Sauvé
St-Eustache (Québec) J7R 5A8
Tél.: 450 473-1884
Télécopieur/Fax administration: 450 491-5498
Télécopieur/Fax production: 450 491-6454

Certificat de conformité
Certificate of Conformity

BON DE TRAVAIL order	CHARGEMENT load
175005	1

CLIENT / customer 216
DART AEROSPACE
1270 ABERDEEN
HAWKESBURY ON K6A 1K7

LIVRÉ À / shipped to: 1
DART AEROSPACE
1270 ABERDEEN
HAWKESBURY ON K6A 1K7

BON DE COMMANDE DU CLIENT customer po	BON DE LIVRAISON DU CLIENT customer shipper no.	MATÉRIEL material	CODE DE TRAITEMENT matl heat code	NUMÉRO DE LOT lot number
		Steel		

SPÉCIFICATIONS DU PROCÉDÉ
processing specifications

STRESS REL

SAE AMS 2759/1 REV.E

EXIGENCE / requirement SPÉCIFICATIONS / specified TESTS EXÉCUTÉS / performed RÉSULTATS DE TESTS / results

Visual

QUANTITÉ quantity	POIDS weight	DESCRIPTION DES PIÈCES parts description
8	270	D350-748-141-F-1

COMMENTAIRES / comments

INSPECTEUR / inspector: METCOR 7 DATE: 2012-04-05

Dora Cameron

From: Dan Stow <dstow@dartaero.com>
Sent: April 18, 2012 4:42 PM
To: Dora Cameron
Subject: FW: 350 crosstubes oval cuffs

DART AEROSPACE

Dan Stow
Special Projects Manager
T. 613-632-5200 | C. 613-676-3320 | F. 613-632-1426
1270 Aberdeen Street, Hawkesbury, Ontario, Canada, K6A 2K7

From: David Shepherd [mailto:dshepherd@dartaero.com]
Sent: Wednesday, April 18, 2012 12:10 PM
To: 'Bill Beckett'
Cc: 'Dan Stow'; 'L Lacelle'; 'Mike Petsche'; 'Eric Downing'; 'Pat Smith'
Subject: RE: 350 crosstubes oval cuffs

Agreed ... This seems OK to me ... Hopefully we only need to do this to a handful of crosstubes.

David

From: Bill Beckett [mailto:bbeckett@dartaero.com]
Sent: April-18-12 6:31 AM
To: 'David Shepherd'
Cc: 'Dan Stow'; 'L Lacelle'; 'Mike Petsche'; 'Eric Downing'; Pat Smith
Subject: RE: 350 crosstubes oval cuffs

David,
This looks like a relatively controllable process that we could have Dan carry out on the other crosstubes that are oval in the cuff area.
If you agree with this rework method, we will proceed with the remainder of the crosstubes. I suggest we do this via markup on the specific work orders.
Bill

From: Dan Stow [mailto:dstow@dartaero.com]
Sent: April 18, 2012 7:52 AM
To: Bill Beckett; David Shepherd; 'Mike Petsche'; L Lacelle; Eric Downing
Subject: 350 crosstubes oval cuffs

Hello All,

Please reference photo attached. The crosstube was placed in a hydraulic press between two sheets of plywood to prevent damage with the max. dimension facing up and down. 9000 lbs (5000psi at 1.5" bore) was applied and then crosstube was removed from the press and measured. Process was repeated with the crosstube at a different position because the max. dimension had changed location. Total time for rework was approximately 20 mins.

Cuff dimension before rework was min. 2.200" max. 2.280"

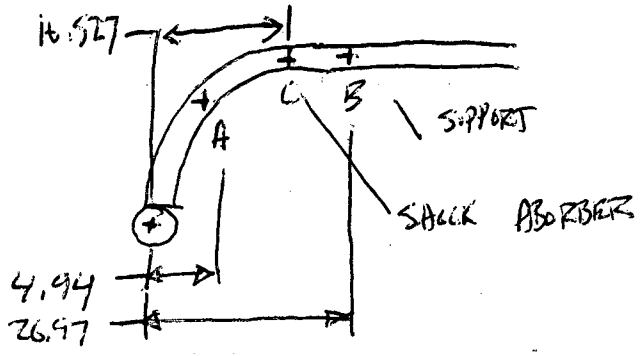
Cuff dimension after rework is min.2.230" max. 2.252" which is 0.010" below tolerance and 0.007" above tolerance but now fits in the drill jig.

DART AEROSPACE

Dan Stow
Special Projects Manager
T. 613-632-5200 | C. 613-676-3320 | F. 613-632-1426
1270 Aberdeen Street, Hawkesbury, Ontario, Canada, K6A 2K7

12.04.19

CRUSHING OF D350-748-101



POINT A $OD_1 = 2.400$ $OD_2 = 2.044$

$CRUSHING = (2.400 - 2.044)/(2.400 + 2.044) = 8\%$

$I = 0.361\ in^4$ (AUTOCAD)

POINT B $OD = 2.339$ $ID = 2.000$

~~CROSHING~~ $I = 0.684\ in^4$

At A $F = Mc/I = P \times 4.94 \times 2.044/2 \times 0.361 = 13.98\,P$

At B $F = P \times 26.97 \times 2.339/2 \times 0.684 = 46.11 \times P$

$M.S. = 46.11/13.98 - 1 = 2.30$

∴ Tube will fail at support before tube fails at area of max crushing. ∴ 8% CRUSHING IS Acceptable.

POINT C $I = 0.684\ in^4$

$F = Mc/I \Rightarrow$ ~~P x 16.527 x 2.339/2 x 0.684~~ $P \times 16.527 \times 2.339/2 \times 0.684 = 28.26 \times P$

$MS = 28.26/13.98 - 1 = 1.02$

∴ Tube will fail at shock absorber before area of max crushing ∴ 8% crushing is acceptable

12.04.19

CERTIFICATE OF
CONFORMANCE

CADORATH PLATING CO. LTD.
2150 LOGAN AVENUE
WINNIPEG, MANITOBA R2J-0J1

DATE: May-08-2012

CONSIGNED TO: Dart Aerospace Ltd.
1270 Aberdeen St.
Hawksbury, ON K6A 1K7

W/O #: 114040
INVOICE #: 60317

CONTRACT OR
PURCHASE ORDER # PO16826

DESCRIPTION: SKID

QTY 1

P/N # d350-748-101

S/N # 76573

CADMIUM PLATE IAW AMS-QQ-P-416C TYPE 2 YELLOW CLASS 2.
MPI IAW ASTM-E-1444. BAKE HEAT CHART # 12-425 AND # 12-451

CERTIFICATE: I certify that the items indicated here on have been inspected and tested and conform to all specifications and requirements detailed on the contract or purchase order.

CI
22

Approved Inspector: _____

ACUREN

RAPPORT D'INSPECTION PAR RESSUAGE

P- 1120[illegible]

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CLIENT	Dart Aerospace	DATE	May 17th 2012 HEURE AM ☐ PM ☑
ATTENTION	Mme Chantal	Nº TRAVAIL ACUREN	188-12-2012
ADRESSE	1270 Aberdeen St	Nº CLIENT PO/WO	30551
	Hawkesbury, Ont	SITE DE TRAVAIL	Hawkesbury
		ACCEPTATION STD.	ASW E 417 05 DATE/RÉV. 2005
PROJET	Inspection Fluorescent on crosstubes external surface		
ITEM(S) EXAMINÉ	9 Crosstubes		

DESCRIPTION DES TRAVAUX	Nº PROCÉDURE LT-002	DATE/RÉV. 2009	Nº TECHNIQUE LT-002	DATE/RÉV. 2009

Nº ITEMS: 9 Crosstubes see below — MATÉRIEL: Steel — ÉPAISSEUR: —

DESCRIPTION: Fluorescent inspection, 100% on external surface on 9 Crosstubes

DÉTAILS DES INSPECTIONS

MÉTHODE : ☑ FLUORESCENT ☐ VISIBLE			☑ LAVABLE À L'EAU ☐ MÉTHODE DISSOLVANT ☐ PRÉ-ÉMULSIONNANT	
MARQUE : Magnaflux	TEMPS PÉNÉTRATION MIN.	10 MIN.	LUM. NOIRE S/N 16460 ☐ PUISS. > 1000 μ W/CM² ☐ AMBIANT < 2 fc	
PÉNÉTRANT : Zyglo ZL 67	TEMPS SÉCHAGE MIN.	>10 MIN.	ÉQUIP. LUMIÈRE ☐ LAMP.POCHE ☐ LAMP.CULASSE ☐ PUISS.>100 fc @ SURFACE	
DISSOLVANT PÉNÉTRANT H2O	TEMPS PÉNÉTRATION MIN.	10 MIN.	AUTRES	DATE CAL DUE
RÉVÉLATEUR SKD-S2			MÈTRE LUM. N/S	
TYPE RÉVÉLATEUR ☑ NON AQUEUX ☐ AQUEUX ☐ SEC				

SURFACE INSPECTÉE

CONDITION SURFACE	☐ MEULÉE	☐ SOUDÉE	☑ MACHINÉE ☐ GRENAILLÉE	☑ MÉTAL PROPRE
TEMPÉRATURE SURFACE	☐ < - 4°C/ 20°F	☐ - 4°C/ 20°F DE 10°C/50°F	☑ 10°C/50°F DE 52°C/125°F	☐ > 52°C/125°F

RÉSULTATS- (☑ MÉTRIQUE ☐ IMPÉRIAL)

See other sheet For Result

P/O 17031

SIGNATURES

REPRÉSENTANT	Ian Titley (MOULÉ)	SIGNATURE
TECHNICIEN (SIGNATURE):		FTJ#
NOM (MOULÉ):	Pierre-Luc Dion	RAPPORT RÉVISÉ PAR: NOM / INITIALES
1ER TECHNICIEN: ONGC NIVEAU 2, SNT NIVEAU 2, ONGC Nº REG. 12205	2ÈME TECHNICIEN: ONGC NIVEAU ___, SNT NIVEAU ___, ONGC Nº REG. ___	

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BLANCHE – COPIE DU CLIENT · JAUNE – COPIE DU BUREAU · ROSE – COPIE DU TECHNICIEN · OR – COPIE DU BUREAU

PT Décembre 200[illegible]

ACUREN

RAPPORT D'ESSAI NON DESTRUCTIF

(SUITE)

RAPPORT P-11261

CLIENT Bell Aerospace — DATE May 17, 2012 — HEURE ☐ AM ☐ PM

ATTENTION — NO. TRAVAIL ACUREN 188-12-2012

RÉSULTATS → (☐ MÉTRIQUE ☐ IMPÉRIAL)

Crosstubes

①	work order	ID	83060	Item ID	D350-748-101				Inspection OK
	"	"	"	77766	"	"	"	"	"	OK
	"	"	"	76574	"	"	"	"	"	OK
	"	"	"	81518	"	"	"	"	"	OK
	"	"	"	76573	"	"	"	"	"	OK
	"	"	"	77763	"	"	"	"	"	OK
	"	"	"	73807	"	"	"	"	201	OK
	"	"	"	81523	"	"	"	"	201	OK

② # on crosstube B83060

No paper work Fit with this number

Inspection OK

2 x-tubes under batch # 83060

→ Preliminary Design

Étendue des Services

L'entente selon laquelle le Groupe Acuren Inc. exécute les service descriptions, les observations et les expressions d'opinions faites pe pas des déclarations ou des garanties ou ne peuvent être interpré entière des décisions prises en matière d'ingénierie, de fabrication, services rendus.

Norme de Diligence

Dans l'exécution des services, le Groupe Acuren Inc. applique le de localité ou dans une localité similaire. Aucune autre garantie, implic

dent au-delà de l'exécution des services demandés. Il est entendu que toutes les on et les hypothèses fournies par le propriétaire/opérateur, et elles ne constituent a propriétaire/opérateur, et le propriétaire/opérateur conserve la responsabilité rapport avec les services décrits dans les présentes ne peuvent excéder le coût des

emblables par d'autres fournisseurs de ce type de services opérant dans la même

SIGNATURES

REPRÉSENTANT À LA CLIENTÈLE: Ian Tinley (MOULÉE) — (SIGNATURE)

TECHNICIEN (SIGNATURE)

NAME (MOULÉE): Pierre-Luc Dufour

1er TECHNICIEN — NIVEAU CGSB 2 — NIVEAU SNT 2 — NO. ENREG. CGSB 12205

2e TECHNICIEN — NIVEAU CGSB ____ — NIVEAU SNT ____ — NO. ENREG. CGSB ____

FTJ #: ____

RAPPORT REVISÉ PAR: ____ NOM ____ INITIALES

H-3050

BLANCHE – COPIE DU CLIENT JAUNE – COPIE DU BUREAU ROSE – COPIE DU TECHNICIEN OR – COPIE DU BUREAU